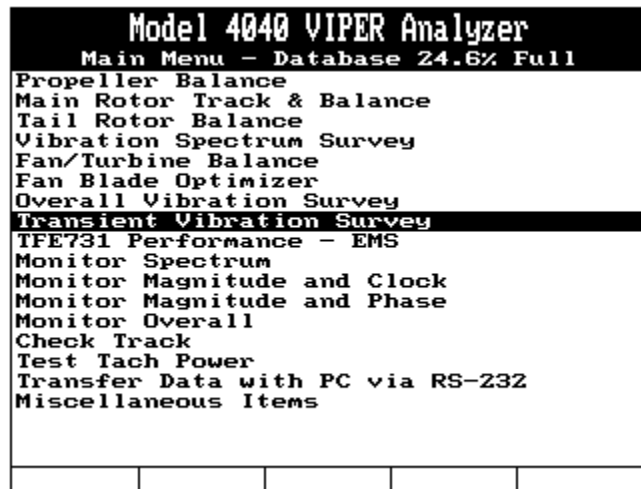

Chapter 11

Transient Vibration Survey

(Revision 2, Aug 2007)

“Transient Vibration Survey” is an analyzer function that is accessed from the analyzer’s Main Menu banner screen as shown in the illustration below. Selecting this function from the main menu brings up the “Transient Vibration Survey Jobs” banner screen menu. Each of the listings on this banner screen menu is an option within the “Transient Vibration Survey” function. Descriptions of each of these options follow, along with the information required to complete the menu screens within the options, and the steps necessary to perform the transient vibration survey function.



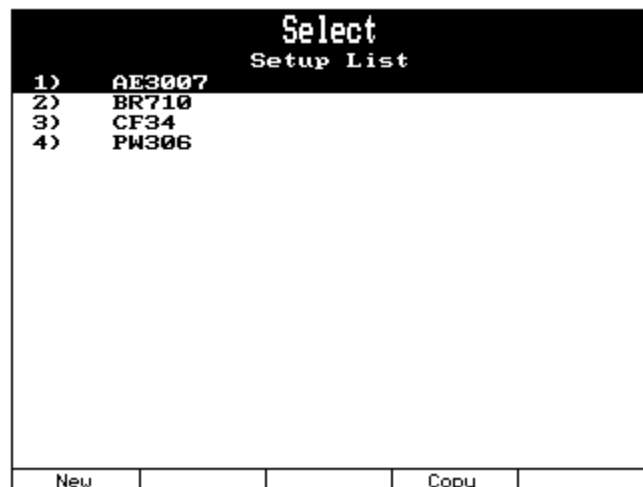
The Transient Vibration Survey option allows the user to rapidly complete and store a transient vibration survey using the “Setup” feature (described in section 11.1.1 below). With the setup feature you may complete surveys on several different components without manually entering the setup data between surveys. Each job is unique and very quick.

11.1. - Start Job

Selecting “Start Job” from the “Transient Vibration Survey Jobs” banner screen allows you to begin a transient vibration survey. When you select this option, one of two screens will appear next depending on whether you are starting a job from scratch or whether an incomplete job still exists in the analyzer’s memory.



If you have previously saved setups in the analyzer’s memory, a screen displaying the list of setups, as shown below, will be displayed. If no setups are stored, or if you choose “New” by pressing the [F1] key from the Setup List screen, the analyzer will display the “Transient Survey Setup” banner screen. If you select from the list, you proceed to the “Job Identification” banner screen described in section 11.1.2. Instructions for completing the “Transient Survey Setup” banner screen appear in the following Section, 11.1.1.



Model 4040 VIPER Analyzer				
Transient Survey Setup				
Name :	<input type="text"/>			
RPM :	<input type="text" value="0.00"/>	to	<input type="text" value="10000.00"/>	
Resolution :	<input type="text" value="400"/>	lines		
Display :	<input type="text" value="Overall Record"/>	Every	<input type="text" value="0"/>	ms
Define related tachs? :	<input type="text" value="Yes"/>			
Channel	Units	Mod	Max	Tach 1 2 3 4
A :	<input type="text" value="None"/>			
B :	<input type="text" value="None"/>			
C :	<input type="text" value="None"/>			
D :	<input type="text" value="None"/>			
Channel	Sensor	Desc		
A :				
B :				
C :				
D :				
Config			Plots	Limits

If another job was in progress but was not completed, the “Incomplete Job” banner screen will be displayed to inform you of this. The analyzer will then display a message prompting you to verify that you want to complete the in-progress job or that you want to ignore it and begin a completely new job. This verification prevents you from accidentally erasing data from an in-progress job. The screen will display the message “The last job performed is incomplete. Do you want to RESUME work on it?”

Model 4040 VIPER Analyzer				
Incomplete Job				
<p>The last job performed is incomplete.</p> <p>Do you want to RESUME work on it?</p>				
Yes				No

You must then choose a “Yes” or “No” answer by pressing the corresponding [F1] key, for “Yes,” or the [F5] key, for “No.” The “Yes” answer will return you to the point where the in-progress job was stopped and allow you to complete it. If you choose the “No” answer, the screen will then display the “Transient Survey Setup” banner screen so you can program a new job setup *or* if you have previously-saved setups stored in the analyzer’s memory, a screen displaying the list of setups will be displayed. You can then select a setup from this list. If you select from the list, you proceed to the “Job Identification” banner screen described in section 11.1.2. Instructions for completing the “Transient Survey Setup” banner screen appear in the following Section, 11.1.1.

NOTE

The analyzer will store Setups as long as available memory remains. If you are attempting to store a survey that will exceed the analyzer's memory capacity, the analyzer will display a message saying "You must delete an item before adding a new one." Press the [BACKUP] key and select "Manage Setups" to delete the Setup of your choosing. It is advisable to transfer setups to AvTrend for storage and, when necessary, retrieval.

11.1.1. – Transient Survey Setup

The "Transient Survey Setup" banner screen allows you to define and store a transient vibration survey setup. As shown in the figure below, some fields in this screen have default values that appear automatically. You can use this information if appropriate or input your own specific setup information using the keypad. (Refer to Chapter 3, "Using the Viper 4040 Analyzer" if you are unfamiliar with using the keypad.) The analyzer will display the "Transient Survey Setup" banner with default values or values entered from the previous job such as those shown in the figure below.

Channel	Units	Mod	Max	Tach			
				1	2	3	4
A:	None						
B:	None						
C:	None						
D:	None						

Channel	Sensor	Desc
A:		
B:		
C:		
D:		

Config Plots Limits

To complete the "Transient Survey Setup" banner screen, do the following:

1. Using the keypad, enter a name for the transient vibration survey setup. (Refer to Chapter 3, "Using the Viper 4040 Analyzer" if you are unfamiliar with using the keypad.)
2. Using the [↓] key, move to the frequency unit field which is defaulted to "RPM". The two selections are RPM and Hz. Determine if the display frequency units are to be in revolutions per minute (RPM) or cycles per second (Hz), then use the [⇒] key to "toggle" between the two selections in this field. If the frequency unit you desire is not currently in the field, press the [⇒] key to toggle between the two choices until your unit is shown in the field.
3. Use the [↓] key to move to the minimum frequency field, immediately to the right of the frequency units field. Use the analyzer keypad to enter the minimum frequency of interest for this survey relative to the frequency units selected in step 2 above. If you

- desire a high pass frequency, such as 40 Hz, the minimum frequency field should reflect this as the minimum frequency of interest.
4. Use the [↓] key to move to the maximum frequency field, immediately to the right of the word “to” and the minimum frequency field. Use the analyzer keypad to enter the highest frequency of interest for this survey relative to the frequency units selected in step 2 above. You should also consider other factors such as Harmonics. If you want multiples of the fundamental frequency included in the frequency range, determine to what extent that need is (1X, 2X, 3X, and so on) then extend the frequency range to include it. For example, 300Hz is the frequency of interest, the fundamental frequency. If you want 3X harmonics included in the frequency range you must multiply the fundamental frequency (300 Hz) X the harmonic range (3X) and arrive at an upper range of 900 Hz.
 5. Use the [↓] key to move to the “Resolution:” field. Resolution is the number of lines of resolution for the spectra display. Press the [⇒] key to increase the number of lines up to 6400. Normally 400 to 800 lines are sufficient for spectra. Higher resolutions may be used when separation of two frequencies of very close proximity is required.
 6. Use the [↓] key to move to the “Display” field. Use the [⇒] key to select the Display type. Your selection in this field will determine how the data is displayed on the analyzer screen during acquisition. A selection of “Overall Record” will provide a numeric value reading only while a selection of “Spectra Record” will display a full spectral graph of the acquired data. Either selection will cause the analyzer to begin recording data as soon as the data acquisition process begins. It should be noted that a setting of “Overall Record” in this field will provide faster data updates and a higher accuracy due to the lower demand on the digital signal processors for this type of display. The data can then be review or played back after recorded in full spectral or waterfall modes. The selection of “Overall Trigger” allows the user to begin the data acquisition process, view the data and confirm the values then select the point at which data will begin to get recorded.
 7. Use the [↓] key to move to the “Every” field. Enter a sample rate in numbers of samples per millisecond. The sample rate determines how often the analyzer acquires the data. A setting of “0” tells the analyzer to update as rapidly as possible for existing conditions. A setting 1000 tells the analyzer to sample once every second. If you are acquiring a “start up” survey, where the engine acceleration is automatic and very rapid, you may wish to set the rate at shorter intervals, 50 or 20 for instance. If you can control the acceleration or deceleration of the engine (or component being checked) you may wish to set the rate at longer intervals, 200 or 500 for instance.
 8. Use the [↓] key to move to the “Define related tachs?” field. This field will allow you to define correlations between vibration channels and tach signals. The default field value is <No> which correlates all vibration channels with all tach inputs. By selecting <Yes>, using the [⇒] key, additional Tach selection fields will appear to the right of the “Max” fields in the upper set of “Channel” definition rows. See step 12 below for information about filling in additional fields that will appear as a result of your selection.
 9. Use the [↓] key to move to the “Units” column of the “Channel A:” row. Select an engineering unit from the available list by using [⇒] key. A selection of “None” in the field indicates there will be no input to the Channel (A, B, C, or D) adjacent to the field where the word “None” appears. Your selection determines the engineering units in

which the vibration spectra will be displayed. Each channel is independent of the other three so that the type of unit can vary between channels. For example, you may select IPS in channel A for velocity, gs in channel B for acceleration, Mills in channel C for displacement, and db in Channel D for acoustics. Any selection, other than “None” will automatically provide additional selection fields in the “Mod” and “MaxValue” columns.

10. Use the [↓] key to move to the “Mod” field. The “Mod” field determines the modifier that will be applied to the engineering units of the spectra. Consult your equipment maintenance manual for specific requirements of a vibration survey or for analysis guidelines. Use the [⇒] key to select the modifier, such as Peak, Peak-to-Peak (Pk-Pk), RMS or Average. Consult the appropriate equipment maintenance manual for specific requirements of an overall vibration survey or for analysis guidelines.
11. Move to the “MaxValue” field using the [↓] key. “MaxValue” means the Maximum Amplitude value, relative to the engineering units selected in step 9 above, you expect to see in this job. Use the [⇒] key to select a maximum value above, but not less than the value you expect to see.
12. Use the [↓] key to move to the “Tach x” field as appropriate. When the “Define related tachs?” field in step 8 above is set to “Yes” and the field is exited, the “Tach x” portion of the Channel line will become visible. Use the [↓] key to move from field to field even though the fields are arranged horizontally. Once a field is highlighted, use the [⇒] key to select (display a dot in the box) or deselect (erase a dot in the box) the Tach input you would like to correlate with the vibration channel described by this line line.

NOTE

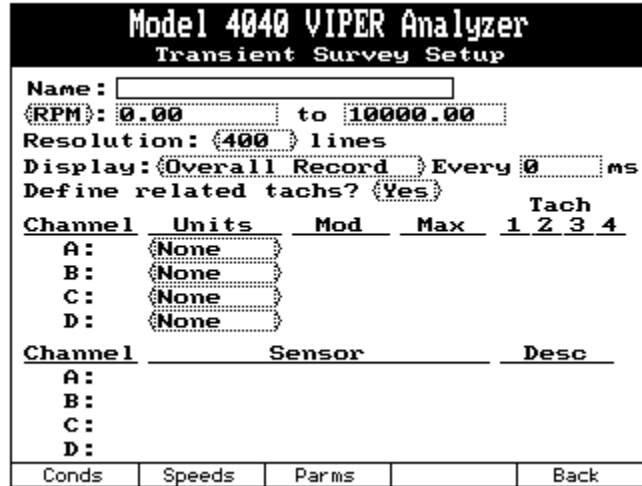
Encountered amplitudes above this setting may cause the analyzer to overload. An overload will result in spurious harmonics and may cause unusual termination of the job. It is best to set the “Full Scale Vibration” higher than needed as opposed to lower than needed for this reason. The overload does not cause a fatal error. You may recover from the overload by pressing the [MAIN MENU] key and starting the process again from the beginning. However, avoiding an overload will save time in the process.

13. Repeat steps 9 through 12 above for each of the four channels per your requirements.
14. Move to the “Sensor” column in the Channel A: row by using the [↓] key. Use the [⇒] key to select the sensor you will use for this channel. If the sensor you are using is not in the selection list, you must enter the sensor setup. See Chapter 18 for entering a sensor setup.
15. Move to the “Desc” (description) column in the Channel A: row by using the [↓] key. Use the analyzer keypad to enter a six character description for the channel such as “#1 Eng”, or “Fan”.
16. Repeat steps 14 and 15 for each of the four channels per your requirements.

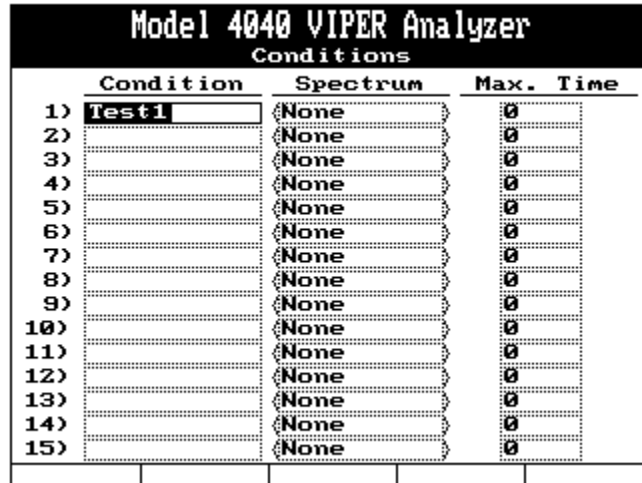
11.1.1.1. – Config

The “Config” (which corresponds to the [F1] key) selection appears at the bottom left of the “Transient Survey Setup” banner screen. Press the [F1] key if you wish to define Conditions,

Speeds, and Parameters for the survey. If you choose this option by pressing the [F1] “Config” key, the Transient Survey Setup banner screen does not change, however, the definitions for the function keys at the bottom of the screen will change as shown in the example below.



The “Conds” (conditions) key, which corresponds to the [F1] key, will display the Conditions screen as shown in the example below.



To input conditions, do the following:

1. Use the [↑] and [↓] keys to navigate the screen and input data from the keypad or select conditions' using the [⇒], and [⇐] keys.
2. In the “Condition” column, use the analyzer keypad to enter a descriptive name for up to fifteen conditions. You may define up to fifteen individual points at which you collect

and optionally store data. When defined, these conditions are stored with the setup and are accessed when the setup is selected and set into motion.

- In the Spectrum Column, select from NONE, PEAK HOLD, AVERAGE, WATERFALL, or TIME per your requirements.

Note

The WATERFALL option must be selected to utilize the playback feature of the analyzer and AvTrend.

- In the “Max. Time” column, enter the maximum amount of time, in seconds, that you wish to automatically collect and stop data collection for that condition. This option is used as both a time and memory management tool. It also allows the analyzer a specific time block to collect data at the specified condition. Following data acquisition for the specified amount of time, data collection will terminate allowing you to proceed to the next condition. A setting of “0” will allow the analyzer to acquire data until terminated by the user pressing [ENTER].
- When all conditions are completed per your requirements, press [ENTER] to accept and exit back to the “Transient Survey Setup” screen.

11.1.1.2. – Speeds

The “Speeds” (which corresponds to the [F2] key) selection appears at the bottom, second from the left, of the “Transient Survey Setup” banner screen. Press the [F2] key if you wish to define speed inputs for the survey. If you choose this option, the following “Speed Inputs Setup” banner screen is displayed. There are two sets of fields with four rows each, 1, 2, 3, and 4 indicating the four tachometer input channels. There are seven columns, Measure, DESC, OFF/100%, Factor, Plot Min, Plot Max, and Plot Div. These inputs are described below.

Model 4040 VIPER Analyzer						
Speed Inputs Setup						
	Measure	DESC	OFF/100%	Factor		
1)	None		0.00000	0.00000		
2)	None		0.00000	0.00000		
3)	None		0.00000	0.00000		
4)	None		0.00000	0.00000		
Plot Info:						
	Min	Max	Div			
1)	0.00	0.00	0			
2)	0.00	0.00	0			
3)	0.00	0.00	0			
4)	0.00	0.00	0			

To define Speed inputs, do the following:

1. Use the [\uparrow] and [\downarrow] keys to navigate the screen and input or select data using the keypad or the [\Rightarrow], and [\Leftarrow] keys respectively.
2. In the “Measure” column, use the [\Rightarrow] or [\Leftarrow] key to select from Pulse S-H, Volts S, Pulse D-H, Volts D, Pulse S-L, Pulse D-L, or None indicating the tachometer input type for the tachometer input channel indicated. NONE is selected when the corresponding tach channel is not being used. Pulse is used when there is a pulse input such as a Phototach, Lasetach or magnetic pickup. This pulse input may be, but is not necessarily a once-per-rev pulse. The preference is actually a multi-pulse per revolution input. The D or S in the selection depicts either single ended (S) or differential (D) while the H or L depicts a setting of high gain (H) or low gain (L) as required.
3. The “DESC” column is the descriptive name for the tachometer input such as “N1, N2, Fan, or Turbine. Enter up to five alphanumeric characters in this field. The description should be one that all users of this setup are familiar with and easily understand.
4. The “OFF/100%” column is used when the VOLTS selection is made in the “Measure” column described in item 2 above. This field is used to enter the offset if measuring a DC voltage if measuring the frequency in Hertz (Hz) or the frequency at 100% of component speed. Use the keypad to enter the value in the OFF/100% field.
5. In the “FACTOR” column, enter the multiplier for Volts or Hertz to attain the actual component speed. If measuring a voltage, the speed is equal to OFF + voltage x Factor. If using a Pulse input, the RPM is equal to Hertz x Factor. The analyzer assumes the input to be relative to Hz (cycles per second) so that an input of one pulse per revolution (one-per-rev) would require a FACTOR of 60 (1 per-rev X 60 Hz assumed) to equal Revolutions per minute (RPM). Enter the factor using the keypad. For multiple pulses per revolution, divide 60 (Hz) by the number of pulses to display RPM.
6. When viewing Plots, you should know the minimum and maximum speeds of interest. When you arrive at that speed range, use the keypad to enter the “Plot Min”, or minimum speed of interest in this column.
7. For the “Plot Max” you should, likewise, determine the speed range of interest and enter the maximum speed of that range in this column using the keypad.
8. The “Plot Div” determines the intervals or divisions of speed indication on the plots across the full speed range. For instance, if you intend to view the plot in a range of 1000 to 2000 RPM and wish it to be in divisions of 500 RPM, enter “2” in this column using the keypad. That is, the upper range (2000) minus the lower range (1000) divided by increments of 500 RPM = 2 divisions. The valid range for the field is 1 to 10. An entry of 1 will show NO incremental divisions of the X scale.
9. Press ENTER to return to the Transient Survey Setup screen.

11.1.1.3. – ParmS

The “ParmS”, or Parameters, (which corresponds to the [F3] key) selection appears at the bottom center of the “Transient Survey Setup” banner screen. Press the [F3] key if you wish to define data collection parameters for the survey. If you choose this option, the following “Transient Parameters Setup” banner screen is displayed.

Model 4040 VIPER Analyzer				
Transient Parameters Setup				
Description	Type	F(lower)	F(upper)	Speed
N1	Pwr	0.98	1.02	xCS1
N2	Pwr	0.98	1.02	xCS2
	Pwr	0.00	0.00	xCS1
	Pwr	0.00	0.00	xCS1
	Pwr	0.00	0.00	xCS1
	Pwr	0.00	0.00	xCS1
	Pwr	0.00	0.00	xCS1
	Pwr	0.00	0.00	xCS1
	Pwr	0.00	0.00	xCS1
	Pwr	0.00	0.00	xCS1
	Pwr	0.00	0.00	xCS1
	Pwr	0.00	0.00	xCS1
	Pwr	0.00	0.00	xCS1
	Pwr	0.00	0.00	xCS1
	Pwr	0.00	0.00	xCS1
	Pwr	0.00	0.00	xCS1

To input information into the Transient Vibration Parameters screen, do the following.

1. Use the [↑] and [↓] keys to navigate the screen and input or select data using the keypad or the [⇒] and [⇐] keys respectively.
2. In the “Description” column, use the keypad to input a description of the individual component you will track with a speed input. The description should be one that is familiar and easily understood to all users of this setup. In the example above, we have used N1 and N2 for the number 1 and number 2 spools respectively. You might use terms such as FAN, INPUT SHAFT, or COMPRESSOR.
3. In the “Type” column, use the [⇒] and [⇐] keys to select “PWR” for displaying the value of total energy within the specified bandwidth you specify in the “F(lower)” and “F(upper)” columns. Select “MAX” to display the maximum single amplitude peak within the specified frequency bandwidth.
4. Use the keypad to enter the lowest frequency of interest, (F) lower. This is the component speed x this factor and defines the lowest frequency variance where you will monitor the component speed.
5. Use the keypad to enter the highest frequency of interest, (F) upper. This is the component speed x this factor and defines the highest frequency variance where you will monitor the component speed.
6. In the “Speed” column, use the [⇒] and [⇐] keys to select “xRPM, xHz, xCS1, xCS2, xCS3, or xCS4. CS is an abbreviation for “Calculated Speed” The xCS1 through xCS4 selections will base the limit on a dynamic speed reference calculated per your specifications in the Speed Inputs Setup screen above in section 11.1.1.2.
7. When fields are completed for all Parameters, press ENTER to return to the Transient Survey Setup screen.

11.1.1.4. – Plots

The “Plots” (which corresponds to the [F4] key) selection appears at the bottom, second from the right function keys of the “Transient Survey Setup” banner screen. Press the [F4] key if you wish to define plots for display of the collected survey data. If you choose this option, the following “Transient Plot Setup” banner will be displayed.

Model 4040 VIPER Analyzer		
Transient Plots Setup		
Parameter	Time	xCS1
Overall	Yes	Yes
N1	Yes	No

1. The Parameters column is a display of the available parameters for plotting. These are based on your specifications in other screens of the Transient Survey Setup.
2. Use the [↑] and [↓] keys to navigate the screen and use the [⇒] and [⇐] keys to toggle the answer field between “Yes” and “No”. All fields default to No on initial opening of the screen.
3. If you wish to plot a transient survey, toggle the answer field to “Yes” under the column of choice. In the example above, you may choose to plot the OVERALL, and N1 vs. Time and/or vs. Calculated Speed (xCS) inputs. A “No” answer in any field will indicate that you do not wish to plot that parameter.
4. Press ENTER to return to the Transient Survey Setup screen.

11.1.1.5. – Limits

The “Limits” (which corresponds to the [F5] key) selection appears at the far right bottom of the “Transient Survey Setup” banner screen. Press the [F5] key if you wish to define limits. When limits are defined in this page, a limit line will be plotted on the survey screen as a quick reference. If you choose this option, the following Transient Survey Setup screen will be displayed. Note that the only difference from the main Transient Survey Setup screen and this screen is in the function key, [F1] through [F5] selections.

Model 4040 VIPER Analyzer
Transient Survey Setup

Name: AS907
 (RPM): 1200.00 to 30000.00
 Resolution: 400 lines
 Display: Overall Record Every 250 ms
 Define related tachs? No

Channel	Units	Mod	Max
A:	g's	Peak	1.00
B:	g's	Peak	1.00
C:	g's	Peak	1.00
D:	None		

Channel	Sensor	Desc
A:	991D-1	A1
B:	991D-1	A2
C:	991D-1	A3
D:		

L:Parms L:Spec Back

11.1.1.5.1. – L:Parms

The “L:Parms”, or Limit :Parameters, (which corresponds to the [F1] key) selection appears at the bottom left of the Transient Survey Setup screen after selection [F5] “Limits” from the main Transient Survey Setup screen. Press the [F1] key if you wish to define Parameter Limits for the transient survey plots. Use the [↓] key to move from field to field and enter a limit value using the analyzer keypad. When all desired limits are defined, press ENTER to accept your settings and return to the Transient Survey Setup screen.

Model 4040 VIPER Analyzer
Transient Parameter Limits

Parameter	A1	A2	A3
Overall	0.00	0.00	0.00
N1	0.00	0.00	0.00
N2	0.00	0.00	0.00

11.1.1.5.2. – L:Spec

The “L:Spec”, or Limit: Spectra, (which corresponds to the [F2] key) selection appears at the bottom, second from the left of the Transient Survey Setup screen after selection of [F5] “Limits” from the main Transient Survey Setup screen. Press the [F2] key if you wish to define Spectra Limits for the transient survey plots.

Model 4040 VIPER Analyzer
Transient Survey Setup

Name: **JISD-17**
 (RPM): **0.00** to **10000.00**
 Resolution: **400** lines
 Display: **Spectra Record** Every **500** ms
 Define related tach? **No**

Channel	Units	Mod	Max
A:	IPS	Peak	1.00
B:	IPS	Peak	1.00
C:	None		
D:	None		

Channel	Sensor	Desc
A:	797V	INLET
B:	797V	TURB
C:		
D:		

L:ChanA | L:ChanB | L:ChanC | L:ChanD | Back

To define spectra limits, do the following:

1. Choose the spectrum for which you wish to define limits, A-Limits, B-Limits, C-Limits, or D-Limits from the corresponding function key at the bottom of the screen. The letters A, B, C, and D are in reference to the input channel of the analyzer.

Model 4040 VIPER Analyzer
Edit Limits for Channel A: INLET

	F-low	F-high	Unit	Limit
1)	0.00	0.00	xCS1	0.00
2)	0.00	0.00	xCS1	0.00
3)	0.00	0.00	xCS1	0.00
4)	0.00	0.00	xCS1	0.00
5)	0.00	0.00	xCS1	0.00
6)	0.00	0.00	xCS1	0.00
7)	0.00	0.00	xCS1	0.00
8)	0.00	0.00	xCS1	0.00
9)	0.00	0.00	xCS1	0.00
10)	0.00	0.00	xCS1	0.00
11)	0.00	0.00	xCS1	0.00
12)	0.00	0.00	xCS1	0.00
13)	0.00	0.00	xCS1	0.00
14)	0.00	0.00	xCS1	0.00

CopyToAll | CopyToB | CopyToC | CopyToD

2. Use the [↑] and [↓] keys to navigate the screen and input or select units using the keypad or the [⇒] and [⇐] keys respectively.
3. The “Edit Limits for Channel X” banner screen, where X represents the input channel letter A, B, C, or D, shown above, will be displayed.
4. Use the keypad to enter the lower frequency (F – low) in the 1) row. Move to the next column (F – high) and again use the keypad to enter the upper frequency limit in the 1) row.

5. Move to the next column (Unit) and use the [⇒] and [⇐] keys to select the frequency unit. This selection will determine the frequency unit where lines will be drawn on the spectra relative to the x (frequency) axis specified in item 3 above.
6. Move to the “Limit” column and enter the amplitude limit for the bandwidth specified in F-low and F-high of the same row. This limit will be displayed as a horizontal line relative to the engineering units specified on the Transient Survey Setup screen in the “Vibration:” field. When all desired limits are set, press [ENTER] to accept your settings and exit the screen.

11.1.2. - Job Identification

The next screen displayed is the “Job Identification” banner screen shown in the following illustration. All information on this screen is optional; however we highly recommend you fill in as much information as possible to ease the task of storage and retrieval of surveys. If you have other customer information stored, you may press the [F1] key to select from a list of stored customer names, which will then be entered into the “Name” field. When all fields are completed as desired, press [ENTER] to continue.

Model 4040 VIPER Analyzer
Job Identification

Name:

A/C Registration:

A/C Total Time:

Press ENTER to continue

Names			
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11.1.3. – Engine Information

The “Engine Information” banner screen is displayed as shown below. Serial number (“S/N”) and “Type” fields are available for both an engine and a propeller so that stored surveys can be traced by either component of the powertrain system. All fields are optional but we highly recommend you fill in as much information as possible for ease of use in trending, recall, and storage.

Navigate (move) between the fields using the [↓] and [↑] keys. All fields are entered from the keypad with the exception of the “Pos” (Position) field, which is a selection field. The position indicates the position on the airplane of the engine, propeller or subcomponent. Using the [⇒] key, select positions from 1 through 4. The “TSO” and “TSN” fields for

“Time Since New” and “Time Since Overhaul” are optional fields. When all fields are filled as required, press [ENTER] to continue.

Model 4040 VIPER Analyzer				
Engine Information				
Position:	1			
Propeller:				
S/N	MC8799			
Type	BLK MAX			
TSO	700			
TSN	1478			
Engine:				
S/N	34889			
Type	10540			
TSO	0			
TSN	1478			
Serial Nos				

11.1.4. – Start Engine

Start the engine (or component) you are checking (generator, gearbox, etc.). When the component reaches normal operating conditions (speed, temp, etc.), press the [ENTER] key to begin acquiring data. You can use the [F2] “Swap Job” key to return directly to the Main Menu without rebooting the analyzer.

Model 4040 VIPER Analyzer				
Start Engine				
Perform FOD check, start the engine, and establish normal operating conditions				
Press ENTER to continue				
Swap Job				

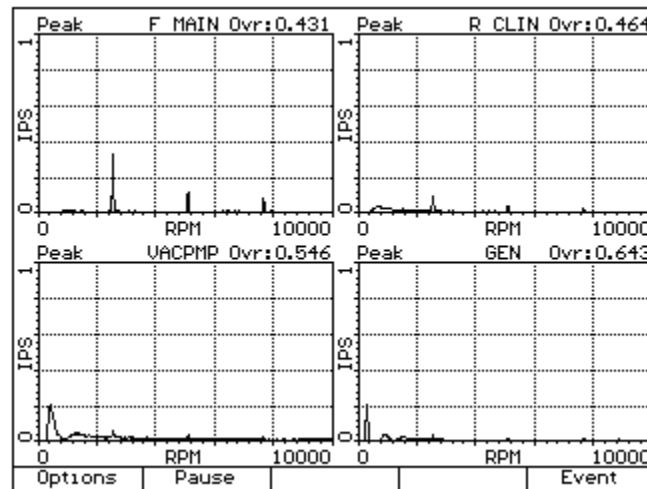
11.1.5. – Select Aircraft Condition

The “Select Aircraft Condition” banner screen is displayed. The conditions are those defined in the “Edit Conditions” screen (see section 11.1.1.1).

Use the [↑] or [↓] keys to select the condition you wish to collect. When your choice is highlighted, press [ENTER] to begin collecting data.

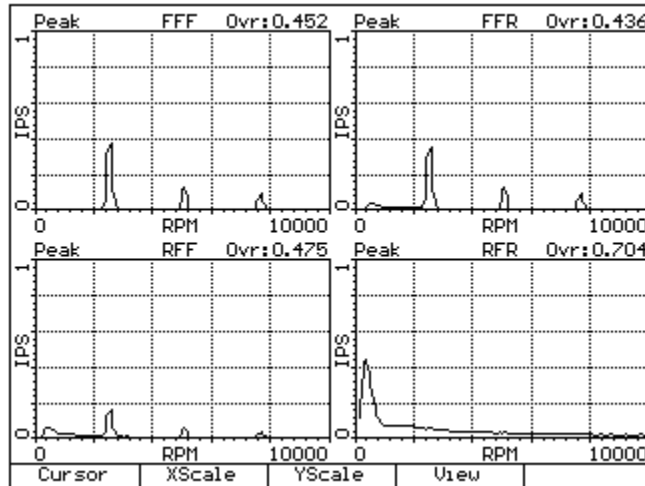
11.1.6. – Collecting Data

If the display type was selected as “Spectra” in step 6 of paragraph 11.1.1 above, the spectra is displayed, you will also see three function boxes at the bottom of the screen (see following figure) corresponding to the position of the [F1], [F2], and [F5] keys directly below them. The boxes read “Options,” “Pause,” and “Event”.

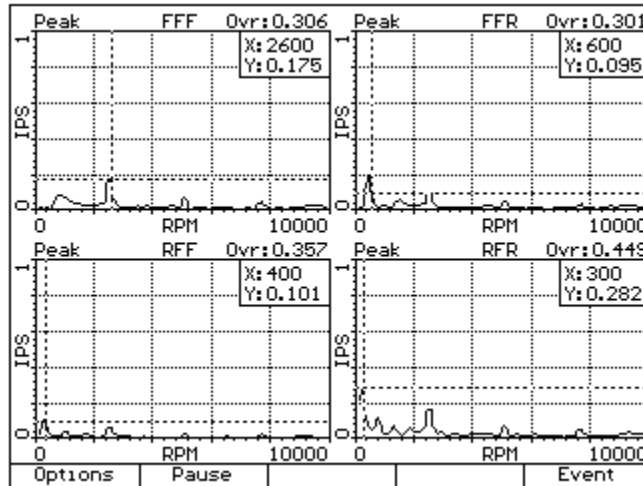


Once any of these “F” key options are selected, both the screen and the corresponding “F” key functions change. With each selection, the “F” keys offer different options (e.g., Expand, Shrink, X scale) for viewing the spectra. The “F” key functions for viewing spectra are described in the following steps.

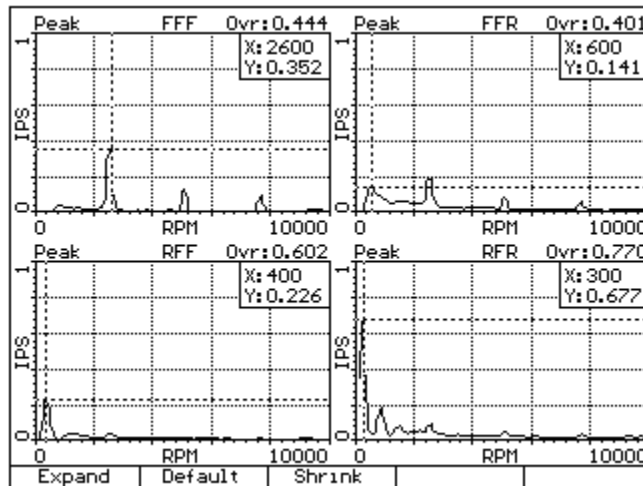
1. Pressing the [F1] “Options” key will change the [F1], [F2], [F3], and [F4] boxes to read “Cursor”, “X Scale”, and “Y Scale”, and “View” respectively as shown in the figure below.
2. Pressing the [F1] “Cursor” key will change the [F1], [F2], and [F3] boxes to read “Normal,” “Harmonic,” and “None” respectively. The functions of the “F” keys will continue to change as the screens change.



3. Pressing the [F1] “Normal” key will produce a normal cursor on the screen accompanied by an X and Y scale value readout box in the upper right corner of each displayed spectra (see the following figure). These X and Y values are relative to the current position of the cursor only. The cursor can be moved along the X (horizontal) axis of the spectra by pressing the [←] or [→] keys. Hold down the key for large and rapid incremental changes. The value of the X-axis (frequency) and Y-axis (amplitude) will be displayed for the current position of the cursor. Incremental values are determined by the number of lines of resolution specified in the setup screen.
4. Pressing the [F2] “Harmonic” key will produce multiple harmonic cursors according to the specified frequency range. When this key is pressed, cursors will appear to the right of the fundamental frequency identified by the leftmost cursor. For example, if the fundamental frequency is 300 Hz cursors will be placed at 2X (600 Hz) 3X (900 Hz) 4x (1200 Hz) and so on until the upper frequency limit of the screen is met. When the primary cursor (for the fundamental frequency) is moved, the multiple harmonic cursors will automatically follow the movement and position themselves at the new multiple of the fundamental frequency. To remove the harmonic cursors, repeat steps 1 to 2 above. At step 3, press either the [F1] “Normal” or [F3] “None” key and the multiple cursors will be replaced by your selection.
5. Pressing the [F3] “None” key will remove either a normal or harmonic cursor if currently displayed on screen. The three boxes above the [F1], [F2] and [F5] keys will return to “Options,” “Pause,” and “Event” respectively. If no cursor is displayed when pressing this key, only the box nomenclature will change.



- Pressing the [F2] “X scale” key will change the [F1], [F2], and [F3] boxes to read “Expand,” “Default,” and “Shrink” respectively as shown in the following figure.



- Pressing the [F1] “Expand” key will expand the X scale of the spectra, in effect enlarging the viewing area. You might think of this function as a “Zoom Out” feature. The center of the Expanded view will be the position of the cursor prior to pressing the [F1] key. If the view is already at the maximum range of the specified X scale range, no scaling change will occur. However, the cursor will be displayed and the X, Y, and “Ovr” (Overall) values will be shown in the upper right corner of the screen. The [F1], [F2] and [F5] boxes will return to the format described in step 5 above. If you wish to Expand the X scale even further, retrace the steps from that point as described in the text.
- Pressing the [F2] “Default” key will return the X scale to the values specified in the setup. This is a quick and easy way to return all expanded and shrunken scales to that default value without the necessity of numerous keystrokes. If the X scale is already

at the setup values when the [F2] Default key is pressed, the three function boxes will return to “Options,” “Pause,” and “Event”. No other changes will occur.

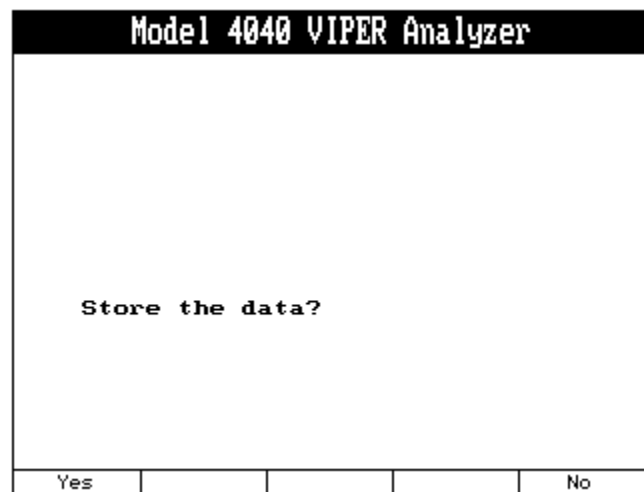
9. Pressing the [F3] “Shrink” key will lower the X scale of the spectra, in effect shrinking the viewing area. You might think of this function as a “Zoom In” feature. If the view is already at the minimum of the specified X scale range, no scaling change will occur. However, the cursor will be displayed and the X, Y, and “Ovr” (Overall) values will be shown in the upper right corner of the screen. The [F1], [F2] and [F5] boxes will return to the format described in step 5 above. If you wish to Shrink the X scale even further, retrace the steps from that point as described in the text.
10. Pressing the [F3] “Y scale” key changes the [F1], [F2], and [F3] boxes to read “Expand,” “Default,” and “Shrink” respectively (see above).
11. Pressing the [F1] “Expand” key will expand the Y scale of the spectra, in effect enlarging the viewing area. You might think of this function as a “Zoom Out” feature. If the view is already at the maximum range of the specified Y scale range, no scaling change will occur. However, the cursor will be displayed and the X, Y, and Ovr: (Overall) values will be shown in the upper right corner of the screen. The [F1], [F2] and [F5] boxes will return to the format described in step 5 above. If you wish to Expand the Y scale even further, retrace the steps from that point as described in the text.
12. Pressing the [F2] “Default” key will return the Y scale to the values specified in the setup. This is a quick and easy way to return all expanded and shrunken scales to that default value without the necessity of numerous keystrokes. If the Y scale is already at the setup values when the [F2] Default key is pressed, the three function boxes will return to “Options,” “Pause,” and “Event.” No other changes will occur.
13. Pressing the [F3] “Shrink” key will lower the Y scale of the spectra, in effect shrinking the viewing area. You might think of this function as a “Zoom In” feature. If the view is already at the minimum of the specified Y scale range, no scaling change will occur. However, the cursor will be displayed and the X, Y, and “Ovr” (Overall) values will be shown in the upper right corner of the screen. The [F1], [F2] and [F5] boxes will return to the format described in step 5 above. If you wish to shrink the Y scale even further, retrace the steps from that point as described in the text.
14. Pressing the [F4] “View” key will display another sub menu. The [F1], [F2], [F3], [F4] keys will be identified by the descriptions assigned in Section 11.1.1 step 15 above. The [F5] key will be labeled “All”. Pressing the “F” key below the name of the channel will enlarge the display of that plot to the full size of the screen. The other plots will continue to gather data they will just be hidden from view. Pressing [F1] “Options”, [F3] “View”, and [F5] “All” will return all available plots to the screen. The “F” keys will return to “Options”, “Pause”, and “Event”.
15. Pressing [F2] “Pause” from the initial function key display will cause data acquisition to stop and the screen to freeze with the latest displayed data. The [F2] key label will change to “Restart”. Pressing [F2] again will cause the data acquisition to resume.

The remaining function keys continue to function as above allowing you to investigate a particular peak or plot without overwriting the displayed data.

16. Pressing [F5] “Event” from the initial function key display will store a marker in the job indicating the time the “Event” key was pressed. Multiple tags will be incremented sequentially as Event 1, Event 2, and so on. The tag will help you identify the point in time during the run when the “Event” key was pressed during the “Review Job” process or in AvTrend.

11.1.7. - Storing Data

Anytime the spectrum is displayed on screen you may press [ENTER] to terminate data acquisition. The analyzer then displays the screen shown below.



The “Select Aircraft Condition” banner screen is again displayed as shown in the following figure. Notice that the condition for which you just collected and stored data now has an “X” immediately to the left of the defined condition. This alerts the user that data has been collected and stored for this condition. This does not preclude you from selecting and acquiring new data for this condition. However, if you choose to store the data, the previously stored data will be written over and may not be recovered.

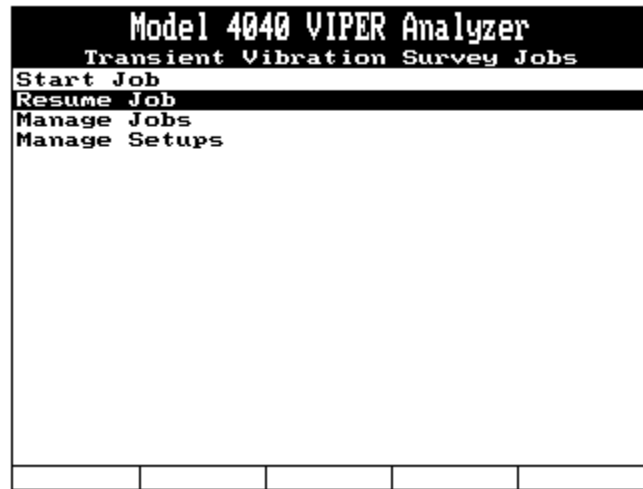
Model 4040 VIPER Analyzer			
Select Condition			
[x]	START		
[x]	IDLE		
[x]	GROUND		
[]	HOVER		
[]	60 KTS		
[]	80 KTS		
[]	100 KTS		
End Run			Quit Job

At this point you may select a new condition and repeat procedures starting from section 11.1.5 until all required data are collected. If you would like to exit the job with the ability to resume it later, you can press the [F1] “End Run” key. This will cause the following screen to be displayed. From this screen, you can use the [F2] “Swap Job” key to return to the Main Menu without rebooting the analyzer. This will leave the job incomplete and suspended in the analyzer’s memory. If you are finished collecting data, shut down the engine(s) per the manual instructions and use the [F5] “Continue” key to mark the job complete and store it to memory.

Model 4040 VIPER Analyzer			
Shut Down Engines			
Shut down engine(s) per manual instructions			
Swap Job			Continue

From the “Select Condition” screen, to quit the job and return to the “Transient Vibration Surveys” banner screen, press [F5] for “Quit Job.”

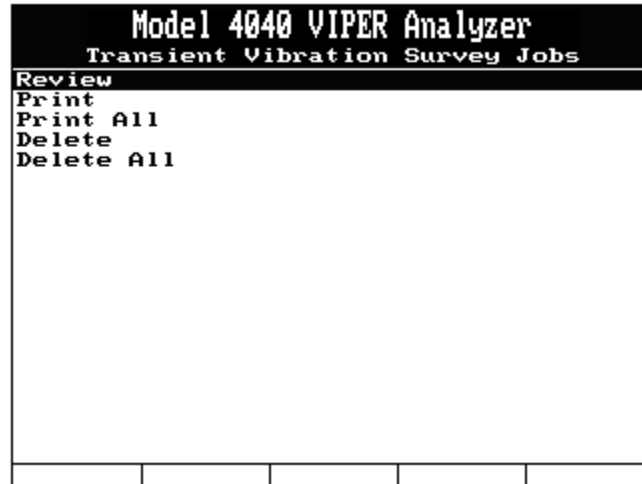
11.2. - Resume Job



When you select “Resume Job” from the “Transient Vibration Survey Jobs” banner screen menu, the “Incomplete Jobs” banner screen will be displayed. Incomplete jobs are listed by name, preceded by an asterisk. Select the job you wish to complete and the analyzer will return you to the point where the in-progress job was stopped, allowing you to complete it. If no in-progress jobs are available to resume, an information screen with that message will be displayed.

11.3. - Manage Jobs

Selecting “Manage Jobs” from the “Transient Vibration Survey Jobs” banner screen menu presents several sub-menu choices to choose from. These choices allow you to “manage” previously completed job data you have stored in the analyzer.



11.3.1. - Review

Selecting the “Review” option presents a list of stored jobs on the “Job List” banner screen. You can select one job for on-screen viewing. When viewing is complete, press the [BACKUP] or [ENTER] key to exit the screen.

11.3.2. - Print

The “Print” option presents a list of stored jobs on the “Job List” banner screen. From the list, you may select one job for printing. See Chapter 21, “Printing” for a detailed explanation of how to set up the analyzer to print.

11.3.3. - Print All

The “Print All” option sends all currently stored jobs to the printer. When you select “Print All,” a message will appear on the analyzer’s “Print All Jobs” banner screen asking you to verify that you want to print all jobs. Answer the prompt, “Are you sure?” by pressing the [F1] key for “Yes” or the [F5] key for “No.” If you choose the “Yes” answer, ensure your printer is prepared (paper, print cartridge, etc.) to complete the number of jobs stored. The “Yes” answer will send *all* currently stored jobs to the printer. The “No” answer will return you to the previous menu.

11.3.4. - Delete

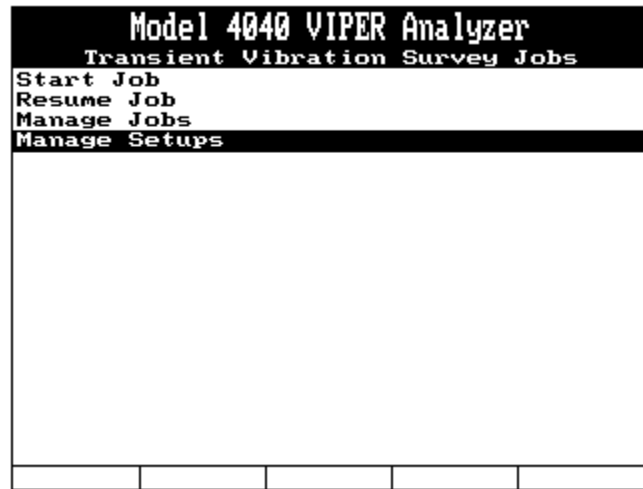
The “Delete” option presents a list of stored jobs on the “Job List” banner screen. From the list, you may select one job for deletion. After making your selection, the “Delete Job” banner screen will appear, asking you to verify your intent to delete the selected job by pressing the [F1] key for “Yes” or the [F5] key for “No.” You may wish to print the job for

reference or permanent record prior to deleting. Once deleted, the job cannot be retrieved from the analyzer.

11.3.5. - Delete All

The “Delete All” option will delete all currently stored jobs. After selecting this option, the “Delete All Job” banner screen will appear, asking you to verify your intent to delete all the jobs by pressing the [F1] key for “Yes” or the [F5] key for “No.” You may wish to print the jobs for reference or permanent record prior to deleting. Once deleted, the jobs cannot be retrieved from the analyzer.

11.4. - Manage Setups



Selecting “Manage Setups” from the “Transient Vibration Survey Jobs” banner screen menu presents several sub-menu choices to choose from. These choices allow you to “manage” job setups you have stored previously in the analyzer.

11.4.1. - Edit

Selecting the “Edit” function displays the “Setup List” screen. Select the setup you wish to edit. The screen will display the “Spectra Setup” screen. Edit the setup as necessary using steps 11.1.1 through 11.1.1.5 above as a guide and press [ENTER] to store and exit the edited setup screen.

NOTE

When the EDIT mode is being used, you must press the [ENTER] key until the screen again displays the TRANSIENT VIBRATION SURVEY JOBS banner screen, shown above, for the edited information to be stored. Using the [BACKUP] key to return to the menu will exit the edit function without storing the new information.

11.4.2. – New

If you select “New,” the “Spectra Setup” screen is displayed. See section 11.1.1 for instructions on how to proceed from this point.

11.4.3. - Print

Selecting the “Print” function displays the “Setup List” screen. Ensure your printer is turned on and connected to the analyzer with the COMM/Print cable supplied with your analyzer. Select the setup you wish to print. (See Chapter 21, “Printing” for a detailed explanation of how to set up the analyzer to print.)

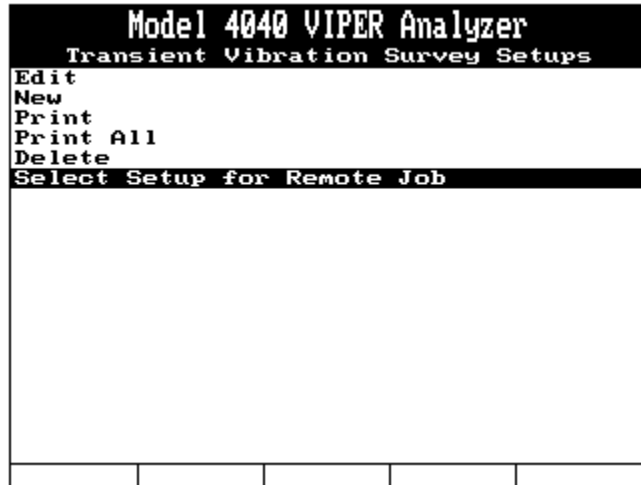
11.4.4. - Print All

Selecting “Print All” sends all currently stored setups to the printer. When making this selection, you will be asked to verify “Are you sure?” by pressing the [F1] key for “Yes,” or the [F5] key for “No.” If choosing the “Yes” answer, ensure your printer is prepared (paper, print cartridge, etc.) to complete the number of jobs stored. The “Yes” answer will send *all* currently stored setups to the printer. The “No” answer will return you to the previous menu.

11.4.5. – Delete

The “Delete” option presents you with a list of stored setups. From the list, you may select one setup for deletion. If you wish to delete all stored setups, you must delete them individually. After making your selection, you will be asked to verify your intent to delete the selected job by pressing the [F1] key for “Yes,” or the [F5] key for “No.” We highly recommend you print the setup for reference or permanent record prior to deleting them. Once deleted, the setups cannot be retrieved from the analyzer.

11.4.6. - Select Setup for Remote Job



The "Select Setup for Remote Job" option allows you to select the name of a transient survey setup to use for a REMOTE transient job. You must select the name of a specific setup from the "Name:" toggle field, as shown below. To help the analyzer properly manage internal memory, you should also enter a time (in seconds) of a typical data acquisition. Valid time entries are between 20 and 999 seconds.

